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(54) Title: **METHOD AND APPARATUS FOR PRODUCING AN IMPLANT**

(57) Abstract: A method for determining a shape of a medical device to be implanted into a subject produces an image including a defective portion and a non-defective portion of a surface of a tissue of interest included in the subject. The tissue of interest is segmented within the image. A template, representing a normative shape of an external anatomical surface of the tissue of interest, is superimposed to span the defective portion. An external shape of an implant, is determined as a function of respective shapes of the defective portion as seen in the template, for repairing the defective portion. An automated neural-net based 3D surface segmentation, automatic template fitting, and representation of the surface as a series of B-spline space curves save time and computational expenses over previous methods. A fit template homology maps the surface to be mirrored or matched to normative data (e.g., an average homology matched surface) to specify the shape of a defect filling implant. The B-spline space curve representation of the surface allows for serial or parallel registration or averaging of sets of space curves.

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